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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/529,709	03/29/2005	Toshiaki Kawanishi	1217-050897	2126

7590 01/22/2009

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EXAMINER	
DAMRON, ANITA B	
ART UNIT	PAPER NUMBER
1797	
MAIL DATE	DELIVERY MODE
01/22/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/529,709	KAWANISHI ET AL.	
	Examiner	Art Unit	
	ANITA B. DAMRON	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *29 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/9/2005,01/28/2008*
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

First Action on the Merits

Summary

1. This is the initial Office Action based on the 10/529,709 application filed March 29, 2005.

2. Claims 1-21 are pending and have been fully considered.

Information Disclosure Statement

3. The information disclosure statement filed November 09, 2005 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each cited foreign patent document; each non-patent literature publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. *Claims 1 and 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over NGK Spark Plug Co. Ltd. Japanese Patent Abstract Publication Number 04-350550 (04.12.1992) herein referred to PAJ 04-350550, in view of Norio Sanma et al., Capacitance-Type Sensor, Society of Automotive Engineers of Japan Gakujutsu Koenkai Mae Satwushu, 01, October 1993, No. 936, pages 257-260 herein referred to as SANMA et al. and as evidenced by Encyclopedia Britannica Online.*

8. Regarding Claims 1 and 2, a capacitance type sensor body with an electrode formed on the surface of an insulating base sheet and the surface of the electrode covered by an insulating resin layer is well known in the art. PAJ 04-350550 teaches a capacitance type alcohol sensor for detecting alcohol in engine fuel. The abstract discloses a pair of electrodes in the shape of a comb-toothed wiring pattern on a ceramic substrate, with an insulation layer.

PAJ 04-350550 however does not teach measuring specific inductive capacitance. The instant claims recite a sensor measuring the change in specific inductive capacity between electrodes.

It is well known in the art that specific inductive capacity is equivalent to relative permittivity and to dielectric constant as evidenced by Encyclopedia Britannica online. It would have been obvious to one of ordinary skill in the art to modify PAJ 04-350550 to measure inductive capacity instead of capacitance as they are directly related and equivalent alternatives.

SANMA et al. in fact teaches that the capacitance between for example a parallel flat electrodes arrangement where the opposing area is S and the distance between electrodes is d, the capacitance Cs that can be expressed by the equation as follows occurs:

> Cs=specific inductive capacity in a vacuum x (S/d) x relative specific inductive capacity x (alcohol content %/100) + relative specific inductive capacity of gasoline x (1 - methanol content %/100).

This shows that measuring the capacitance between electrodes of a known area with a known distance between them, gives the ratio of methanol in alcohol, and the change in specific inductive capacitance.

In addition, PAJ 04-350550 et al. does not specifically teach an oscillation frequency.

. SANMA et al. however teaches a sensor body comprising four circuits. An oscillator circuit to add a square-wave pulse having a given frequency to the electrode unit, a capacitance-duty conversion circuit in which the capacitance generated in the electrode unit is converted to the pulse width, a duty-voltage conversion circuit in which the pulse width is converted to the analog voltage and a DC amplifier circuit. The charge accumulated in the detection capacitance Cs of the electrode unit placed in mixed fuel as dielectric is discharged through the discharge resistor R. Here the discharge time constant significantly changes with changing methanol content. Therefore a value corresponding to methanol content can be obtained by measuring the voltage waveform when this discharge occurs as the time (pulse width) taken for reaching a certain threshold value using the capacitance –duty conversion circuit. When the oscillation frequency was set to a constant value utilizing the threshold value, a nearly linear relationship is confirmed between methanol content % and sensor output (volts).

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the sensor structure of PAJ 04-350550 with the sensor body of SANMA et al. to detect the mixing ratio of fuel by measuring the time constant when a

capacitor formed by the electrodes in the fuel is charged and discharged using an oscillator with a given frequency. This results in a sensor that measures alcohol content as a function of capacitance.

9. Regarding Claim 4, PAJ 04-350550 teaches an electrode pattern that is made in the shape of a comb in the abstract.

10. Regarding Claim 5, PAJ 04-350550 however teaches a capacitance type alcohol sensor for detecting alcohol in engine fuel in the abstract comprising a pair of electrodes in the shape of a comb-toothed wiring pattern on a ceramic substrate, with an insulation layer.

However PAJ 04-350550 does not teach an alcohol concentration in the liquid to be inspected is detected by introducing a liquid to be inspected between electrodes of an alcohol concentration detecting sensor and by measuring a change in a specific inductive capacity of the liquid to be inspected between the electrodes with an oscillation frequency,

SANMA et al. however teaches an alcohol concentration detecting apparatus in which an alcohol concentration in the liquid to be inspected is detected by introducing a liquid to be inspected between electrodes of an alcohol concentration detecting sensor and by measuring a change in a specific inductive capacity of the liquid to be inspected between the electrodes with an oscillation frequency, on page one paragraph 4 through page 4 paragraph 2.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the sensor structure of PAJ 04-350550 with the sensor body of

SANMA et al. to detect the mixing ratio of fuel by measuring the time constant when a capacitor formed by the electrodes in the fuel is charged and discharged using an oscillator with a given frequency.

11. *Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over NGK Spark Plug Co. Ltd. Japanese Patent Abstract Publication Number 04-350550 (04.12.1992) herein referred to PAJ 04-350550, in view of Norio Sanma et al., Capacitance-Type Sensor, Society of Automotive Engineers of Japan Gakujutsu Koenkai Mae Satwushu, 01, October 1993, No. 936, pages 257-260 herein referred to as SANMA et al. further in view of BERGSTRESSER et al. (US 6,296,949 B1).*

12. Regarding Claim 3, PAJ 04-350550 in view of Sanma et al. does not teach a selectively etched wiring pattern. BERGSTRESSER et al. teaches electrode wiring pattern is obtained by selectively etching a conductive metallic foil laminated on one of surfaces of the base material resin film, thereby forming a wiring pattern taking a predetermined shape in column 1 lines 11-19. It would have been obvious to one of ordinary skill in the art to modify the modified device of PAJ 04-350550 to provide a selectively etched wiring pattern given the teachings of BERGSTRESSER et al. in order to provide a specifically shaped wiring pattern.

13. *Claims 6-19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over NGK Spark Plug Co. Ltd. Japanese Patent Abstract Publication Number 04-350550 (04.12.1992) herein referred to PAJ 04-350550, in view of Norio Sanma et al., Capacitance-Type Sensor, Society of Automotive Engineers of Japan Gakujutsu Koenkai Mae Satwushu, 01, October 1993, No. 936, pages 257-260 herein referred to*

as SANMA et al. further in view of BERGSTRESSER et al. (US 6,296,949 B1) in further view of ROUTKEVITCH et al. (US 2002/0118027).

14. Regarding Claim 6, PAJ 04-350550, SANMA et al. and BERGSTRESSER et al. teach the alcohol concentration detecting apparatus according to claim 5, wherein the electrode wiring pattern is obtained by selectively etching a conductive metallic thin film

However the above mentioned references do not teach the process of sputtering to form a wire making pattern.

ROUTKEVITCH et al. however teaches the process of sputtering to form a wiring pattern taking a predetermined shape on the substrate in claim 28. The instant reference is a gas sensor for detecting analytes of which alcohol is in the group as noted in claim 23.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the sensor of PAJ 04-350550, SANMA et al. and BERGSTRESSER et al. with the teaching of sputtering of ROUTKEVITCH et al. as this is a well known method of adding layers to integrated circuits and allows for precise formation of the circuit.

15. Regarding Claim 7, ROUTKEVITCH et al. teaches an insulating coat formed by evaporation deposition, which is a type of chemical vapor deposition. Paragraph 0010 teaches preparation of a device by a layer by layer build up process and an evaporation deposition method and process for manufacturing, and paragraph 0012 teaches aluminum oxide as layering material. The instant reference teaches insulating layers, as well as top and bottom layers.

16. Regarding Claim 8, PAJ 04-350550 teaches an electrode pattern that is made in the shape of a comb in the abstract.

17. Regarding Claims 9 and 10, modified PAJ 04-350550 teaches an alcohol concentration detecting method of detecting an alcohol concentration in a liquid to be inspected by using the alcohol concentration detecting apparatus according to claim 1 in the abstract.

However PAJ 04-350550 does not specifically teach measuring the specific inductive capacity.

SANMA et al. teaches wherein an alcohol concentration in the liquid to be inspected is detected by introducing a liquid to be inspected between electrodes of an alcohol concentration detecting sensor and by measuring a change in a specific inductive capacity of the liquid to be inspected between the electrodes with an oscillation frequency on page 1 paragraph 4 through page 3 paragraph 2.

It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the sensor of PAJ 04-350550 with the sensor body and

measurement teaching of SANMA et al. Electrostatic capacitance is related to specific inductive capacity, and both sensors are of similar structure used for the same purpose.

18. Regarding Claims 11-15, PAJ 04-350550 in view of SANMA does not specifically teach the method of making the apparatus. However, etching using a photoresist mask of a metallic foil on a polymer substrate is well known in the art. BERGSTRESSER et al. teaches a basic component of a printed circuit board of a sheet of copper foil bonded to a dielectric layer such as polyimide in the specification column 1 lines 10-18, and a semi-additive process and a mask material removed in a flash etch process lines 55-62. In addition, ROUTKEVITCH et al. teaches a photoresist mask being applied before iodization, and anodization may be performed in the openings of the mask to form sensor and sensor array substrates in paragraph 0038 of the specification, anisotropic etching in paragraph 0048 and example 2, as well as localized anodization in paragraph 0049 and example 3.

It would have been obvious to one of ordinary skill in the art to modify the modified device of PAJ with the method making teachings of BERGSTRESSER et al. as it teaches the same materials used for manufacturing a circuit which is well known in the art using methods to produce smaller circuits and a method of protecting the circuit from contamination; and the methods of ROUTKEVITCH et al. teaching methods of micromachining nanostructured devices with various materials to improve process monitoring and control, and offer improved sensitivity and stability in harsh environments..

19. Regarding Claim 16, PAJ 04-350550 teaches an electrode pattern that is made in the shape of a comb in the abstract.

20. Regarding Claims 17-19, , PAJ 04-350550 teaches an alcohol concentration detecting sensor.

However , PAJ 04-350550 does not teach a method of manufacture comprising:

a conductive metallic thin film forming step of forming a conductive metallic thin film on one of surfaces of a substrate by sputtering;

a photoresist applying step of applying a photoresist onto a whole upper surface of the conductive metallic thin film;

a photoresist exposing step of exposing the photoresist to take a desirable electrode wiring pattern shape by using a photoresist mask; a photoresist dissolving and removing step of dissolving and removing the exposed photoresist portion with a developing solution;

an etching step of dry etching and removing a conductive metallic thin film portion which is not covered with the photoresist;

a photoresist dissolving and removing step of dissolving and removing the photoresist; and

an insulating coat forming step of forming an insulating coat on a surface of the electrode wiring pattern from which the photoresist is removed, by chemical vapor deposition (CVD),

wherein the substrate is constituted by at least one selected from ceramics, glass and a resin substrate.

wherein the conductive metallic thin film is constituted by at least one selected from platinum, nickel, copper and titanium.

BERGSTRESSER et al. however teaches a method of applying a copper layer to a polyimide film layer (14) by sputtering. Further, an aluminum metallic substrate is attached via a tie-coat layer 16 to the copper layer (18) , to cover the entire surface and adhered to the resin substrate on the sides. The top metallic layer can be removed to expose the copper layer forming a circuit in a combined process involving vacuum metallization and electrodeposition, and a protective film 54 is attached via an adhesive layer (52) in the specification column 3 line20 through column 6 line 27. Although this is a process for a printing a more complex circuit and the present application is a simple alcohol sensor, the method of making is the same.

21. Regarding Claim 21, PAJ 04-350550 teaches PAJ 04-350550 teaches an electrode pattern that is made in the shape of a comb in the abstract.

22. *Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over NGK Spark Plug Co. Ltd. Japanese Patent Abstract Publication Number 04-350550 (04.12.1992) herein referred to PAJ 04-350550, in view of Norio Sanma et al., Capacitance-Type Sensor, Society of Automotive Engineers of Japan Gakujutsu Koenkai Mae Satwushu, 01, October 1993, No. 936, pages 257-260 herein referred to as SANMA et al. further in view of BERGSTRESSER et al. (US 6,296,949 B1) in further*

view of ROUTKEVITCH et al. (US 2002/0118027) in further view of YAMAGISHI (US 5,337,018).

23. Regarding Claim 20, PAJ 04-350550 teaches an alcohol concentration detecting sensor.

However PAJ 04-350550 does not teach wherein the insulating coat is constituted by at least one minute insulating coat selected from SiO_2, $A1_20_3$ and the like.

YAMAGISHI however teaches one insulating coat of silicon dioxide (SIO_2) in the specification column 2 line 65 for example.

It would have been obvious to one of ordinary skill in the art at the time if the invention to combine the teaching of sensor PAJ 04-350550 with the teaching of YAMAGISHI to use silicon dioxide (SIO_2) and aluminum oxide (Al_2O_3) as they are common materials used in sensor technology, readily available, and easily applied in accordance with the methods previously described herein for adding layers to a circuit.

Conclusion

24. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure is related to the main reference cited in this action are as follows: NAKANO et al. (JP 62182643 A) humidity sensor comb tooth aluminum oxide cover; JONDA et al. (WO 9957548 A1) hydrogen conductivity sensor substrate, CVD, sputtering; JONDA et al. (US 6,513,364 B1) hydrogen sensor used in IC engine exhaust; STANBRO et al. (US 4,728,882) capacitive chemical sensor on glass substrate with copper and silicon dioxide; and RAYMOND (US 4,510,436) capacitive

transducer comprised of thin-film capacitors in a fluid –impervious container on a glass substrate.

25. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANITA BUCSAY DAMRON whose telephone number is (571)270-5549. The examiner can normally be reached Monday through Thursday from 6:30 a.m. to 4:30 a.m. EST.

26. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A Warden can be reached on 571-272-1297. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

27. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Anita Bucsay Damron

ART UNIT 1797

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